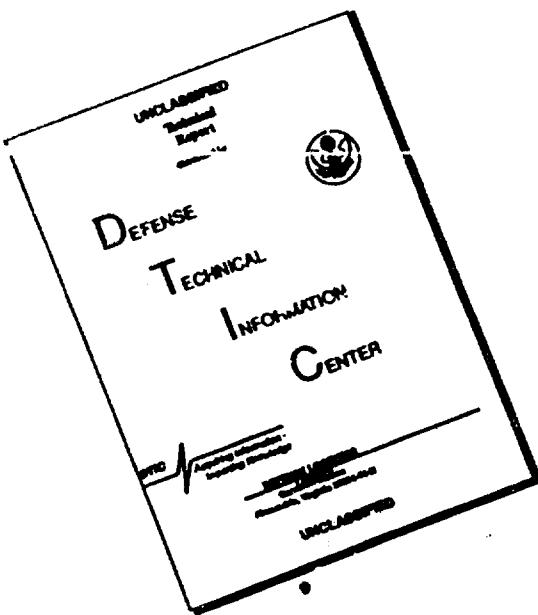


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19. ABSTRACT (Continue on reverse if necessary and identify by block number) The objectives of this conference were to discuss, evaluate, and promote unique and new applications that are awaiting Free Electron Laser devices that will operate at wavelengths below 300 nm. The subjects included: atomic and molecular spectroscopy, materials and surface physics, surface photochemistry, chemical dynamics, industrial photochemical processes, photoelectron spectroscopy, photolithography, materials processing, biological structures and radiation effects, plasma physics, and laser radar.			
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FREE-ELECTRON LASER APPLICATIONS IN THE ULTRAVIOLET

1988 TECHNICAL DIGEST SERIES VOLUME 4

POSTCONFERENCE EDITION

**Summaries of papers presented at the
Free-Electron Laser Applications in the Ultraviolet
Topical Meeting**

March 2-5, 1988

Cloudcroft, New Mexico

Cosponsored by the

**Optical Society of America
Air Force Office of Scientific Research
Department of Energy**

**Optical Society of America
1816 Jefferson Place, N.W.
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A-1

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TUESDAY, MARCH 1, 1988

CRYSTAL ROOM

3:30 PM-6:30 PM REGISTRATION/RECEPTION

FIRESIDE ROOM IN REBECCA'S

6:30 PM-9:00 PM DINNER

WEDNESDAY, MARCH 2, 1988

FIRESIDE ROOM IN REBECCA'S

6:30 AM-8:15 AM BREAKFAST

CRYSTAL ROOM

7:30 AM-1:00 PM REGISTRATION/SPEAKER CHECKIN

MARCA ROOM

8:30 AM-9:00 AM OPENING REMARKS

Howard R. Schlossberg, *Air Force Office of Scientific Research*

Ryszard Gajewski, *Department of Energy*

9:00 AM-10:00 AM

WA FEL FACILITIES I

Howard R. Schlossberg, *Air Force Office of Scientific Research, Presider*

9:00 AM (invited Paper)

WA1 *Projected Performance of rf-Linac-Driven Free-Electron Lasers in the VUV and Soft X-Ray Regions*, Brian E. Newnam, *Los Alamos National Laboratory*. Recent advances in rf-linac electron injectors and high-reflectance mirrors will enable future FEL oscillators to operate at wavelengths < 100 nm with both high-peak and high-average power. (p. 2)

9:30 AM (invited Paper)

WA2 *Ultraviolet Source Characteristics of the Storage-Ring Free-Electron Laser*, David A. G. Deacon, *Deacon Research*. Laser operation can be obtained in the 500-50-nm range, and eventually from 50 to 10 nm. We discuss the output characteristics and illustrate with numerical examples from two facilities now under construction. (p. 9)

WEDNESDAY, MARCH 2, 1988—Continued

MARCA ROOM

10:00 AM-12:50 PM

WB, SOLID-STATE SPECTROSCOPY

Aloysius J. Arko, *Los Alamos National Laboratory, Presider*

10:00 AM (invited Paper)

WB1 *High-Resolution Photoelectron Spectroscopy: Emphasis on Actinides*, Aloysius J. Arko, *Los Alamos National Laboratory*. The impact of the high flux, high energy and spatial resolution of the FEL on photoelectron spectroscopy is discussed, in particular, measurements of resonances and gaps. (p. 16)

MEZZANINE

10:30 AM-10:50 AM COFFEE BREAK

MARCA ROOM

10:50 AM (invited Paper)

WB2 *Novel Magnetic Materials Research Using Free-Electron Lasers*, S. D. Bader, *Argonne National Laboratory*. Spin-polarized photoemission using soft x-ray FELs provides unprecedented opportunities to study ultrathin magnetic films, surfaces, dilute alloys, and other novel magnetic materials. (p. 20)

11:20 AM (invited Paper)

WB3 *High-Resolution Photoemission Spectroscopy Measurements of Superconductors*, David W. Lynch, *Iowa State U*. The ultrahigh resolution of the proposed free-electron laser sources of extreme ultraviolet radiation will allow, for the first time, a direct photoemission measurement of gap anisotropy in superconductors. (p. 24)

11:50 AM

WB4 *High-Resolution Photoemission Studies of Transuranic Actinides with an FEL*, L. E. Cox, *Los Alamos National Laboratory*. A high-intensity, highly monochromatic light source such as an XUV free-electron laser will be required to properly characterize the quasatomic features in the valence-band spectrum of plutonium and its alloys. (p. 26)

12:10 PM

WB5 *X-Ray Absorption Spectroscopy of Elements of Z ≤ 10 Using a Free-Electron Laser Source*, Steven D. Conradson, *Los Alamos National Laboratory*. Direct measurements of the electronic and molecular structures of low-Z elements for systems inaccessible to synchrotron radiation are possible with an XUV FEL (p. 29)

WEDNESDAY, MARCH 2, 1988—Continued

12:30 PM

WC6 Angle-Dependent Photoemission with High Resolution, S. D. Kevan, *U. Oregon*. Advanced instrumentation has enabled progressively higher resolution, angle-resolved photoemission studies of surface electronic structure. The current status and future prospects using FELs are summarized. (p. 32)

FIRESIDE ROOM IN REBECCA'S

12:50 PM-1:50 PM LUNCH

1:50 PM-5:00 PM FREE TIME

RED DOG SALOON

5:00 PM-5:45 PM SOCIAL

FIRESIDE ROOM IN REBECCA'S

5:45 PM-7:00 PM DINNER

CRYSTAL ROOM

6:30 PM-10:00 PM REGISTRATION/SPEAKER CHECKIN

MARCI A ROOM

7:00 PM-9:50 PM

WC, ATOMIC AND MOLECULAR SPECTROSCOPY I
James A. R. Samson, *University of Nebraska, Presider*

7:00 PM (Invited Paper)

WC1 New Research Opportunities in Atomic Photoionization with a High-Intensity, Narrow Bandwidth Photon Source, Manfred O. Krause, *Oak Ridge National Laboratory*. Scientific problems that can be foreseen to be successfully approached by photoionization experiments with photon source of high brilliance are presented and discussed. (p. 40)

7:30 PM (Invited Paper)

WC2 Free-Electron Laser Induced Dissociation of Molecules Probed With Synchrotron Radiation, P. Morin, *CEA/Centre d'Etudes Nucléaires de Saclay, France*. The simultaneous use of FEL and synchrotron radiation to photo-dissociate molecules and ionize the fragments is shown to be a unique tool to probe the dissociation pattern and its dynamics. (p. 43)

WEDNESDAY, MARCH 2, 1988—Continued

8:00 PM

WC3 Polyatomic Shape Resonances and Dispersed Fluorescence Spectroscopy, L. A. Kelly, E. D. Poliakoff, *Boston U.* Highly resolved fluorescence spectra illuminate shape resonant excitation in the photoionization of nitrous oxide, and extensions possible with an FEL are suggested by these results. (p. 47)

MEZZANINE

8:20 PM-8:40 PM COFFEE BREAK WITH DESSERT

8:40 PM (Invited Paper)

WC4 Nonlinear Spectroscopy of Atomic Systems Using XUV FELs, Thomas J. McIlrath, *U. Maryland*. The narrow-band, intense output of the FEL allows both resonant and nonresonant excitation of atoms. Core electrons can be excited and probed. (p. 50)

9:10 PM

WC5 Vacuum Ultraviolet FEL for Laser Cooling of H Atoms, Robert K. Sander, *Los Alamos National Laboratory*. The vacuum-ultraviolet free-electron laser could be used to reduce the velocity of H atoms, for improved spectroscopic resolution and to generate collimated beams. (p. 53)

9:30 PM

WC6 UV FEL Uses in Resonance Ionization Mass Spectrometry, N. S. Nogar, B. L. Fearey, C. M. Miller, *Los Alamos National Laboratory*. Potential uses of an ultraviolet free-electron laser for RIMS analyses are discussed, with particular emphasis on coupling FEL-based photoionization with synchronous laser desorption. (p. 57)

THURSDAY, MARCH 3, 1988

FIRESIDE ROOM IN REBECCA'S

6:30 AM-8:15 AM BREAKFAST

CRYSTAL ROOM

8:00 AM-1:00 PM REGISTRATION/SPEAKER CHECKIN

MARCIAS ROOM

8:30 AM-9:30 AM

ThA. ATOMIC AND MOLECULAR SPECTROSCOPY II

Thomas J. McIlrath, *University of Maryland*, Presider

8:30 AM (Invited Paper)

ThA1 *Uses of a Free-Electron Laser in Atomic and Molecular Physics*, James A. R. Samson, *U. Nebraska*. The combination of VUV high-flux sources with photoelectron and fluorescence spectroscopy is required to study energy levels, autoionization, and molecular dissociative ionization processes. (p. 62)

9:00 AM (Invited Paper)

ThA2 *Use of UV/VUV Free-Electron Lasers in Photoionization Mass Spectroscopy*, R. L. Woodin, D. S. Bomse, *Exxon Research & Engineering Company*. Tunable VUV radiation promises to extend photoionization to include more chemical species and afford selective, sensitive detection of trace chemical constituents in complex systems. (p. 66)

9:30 AM-10:10 AM

ThB, FEL FACILITIES II

Ryszard Gajewski, *Department of Energy*, Presider

9:30 AM

ThB1 *Projected Operation of the SCA/FEL in the Ultraviolet*, H. A. Schwettman, T. I. Smith, *Stanford U*. The superconducting accelerator-driven free-electron laser (SCA/FEL) has been established as a facility for producing picosecond photon beams. The facility at present is capable of operating between 3 μ m and 350 nm. Viable options for extending the range to at least 200 nm are discussed, as are the facilities for experimenters using the photon beams. (p. 72)

THURSDAY, MARCH 3, 1988 — Continued

9:50 AM

ThB2 *Research Opportunities Below 300 nm at the NBS Free-Electron Laser Facility*, Philip H. Debenham, B. Carol Johnson, *U.S. National Bureau of Standards*. Average output power of 25 W in 3-ps pulses at 75 MHz will be available at fundamental wavelengths from 200 to 300 nm beginning in April 1990. (p. 76)

MEZZANINE

10:10 AM-10:30 AM COFFEE BREAK

MARCIAS ROOM

10:30 AM-12:30 PM

ThC, PHYSICS OF SURFACES AND FILMS

E. Ingolf Lindau, *Stanford University*, Presider

10:30 AM (Invited Paper)

ThC1 *Time-Resolved Ultraviolet Photoemission Studies of Surface Dynamics*, J. Bokor, *AT&T Bell Laboratories*. The scientific motivations and technical requirements for picosecond studies of surface dynamics using angle-resolved photoemission techniques are discussed. (p. 82)

11:00 AM (Invited Paper)

ThC2 *Scientific and Technological Uses of Free-Electron Lasers in Ultraviolet Photon-Stimulated-Desorption Spectroscopy*, R. F. Haglund, Jr., *Vanderbilt U*. Photon-stimulated desorption experiments using synchrotron light sources suggest that ultraviolet free-electron lasers will enrich fundamental studies of photon-surface interactions and lead to new developments in ultraviolet optical technology. (p. 85)

11:30 AM

ThC3 *Use of VUV/XUV Free-Electron Lasers in the Study of Defects in Amorphous Optical Materials*, Virgil E. Sanders, Brian E. Newnam, *Los Alamos National Laboratory*. We propose to use the VUV/XUV free-electron laser as a source of UV radiation-induced defects in amorphous optical materials. The optical materials include thin-film coatings and windows used in lasers. (p. 89)

11:50 AM

ThC4 *Vacuum Ultraviolet FEL Uses in the Analysis of Laser-Surface Vaporization Dynamics and Chemistry*, A. O'Keefe, *Deacon Research*. The primary processes occurring during laser vaporization of solids can be revealed using species-selective VUV FEL photoionization. Profiles over the FEL macropulse duration are possible. (p. 91)

THURSDAY, MARCH 3, 1988—Continued

12:10 PM

ThC5 Surface Analysis Using Time-Resolved Techniques in Vacuum Ultraviolet FEL Radiation, Victor Rehn, U.S. Naval Weapons Center. Particle and photon emission from surfaces irradiated by high-intensity FEL pulses in the VUV can be analyzed to determine surface structure. Examples relevant to semiconductor heterostructure materials and yttrium-barium-cuprate superconductors are discussed. (p. 95)

FIRESIDE ROOM IN REBECCA'S

12:30 PM-1:30 PM LUNCH

LOBBY

1:30 PM-5:00 PM TOUR TO SUNSPOT OBSERVATORY

RED DOG SALOON

5:00 PM-5:45 PM SOCIAL

FIRESIDE ROOM IN REBECCA'S

5:45 PM-7:00 PM DINNER

MARIA ROOM

7:00 PM-8:50 PM

ThD, MATERIALS AND SURFACE PROCESSING
Victor Rehn, U.S. Naval Weapons Center, Presider

7:00 PM (Invited Paper)

ThD1 Lithography with Free-Electron Lasers Compared with Deep UV, X-Ray, and Ion Lithography, R. Kent Watts, AT&T Bell Laboratories. Lithography with a free-electron laser source operating in the 30-100-nm range and a reflective mask is a promising way of extending the resolution of optical lithography. Comparisons are made with deep UV, x-ray, and ion lithography. (p. 102)

7:30 PM (Invited Paper)

ThD2 Challenges in the Design and Fabrication of XUV Projection Lithographic Optics, F. Zernike, Perkin-Elmer Corporation; F. Y. Wu, IBM T. J. Watson Research Center. The possibility of making a projection microlithography system capable of printing features with 0.1 μ m critical dimension is examined. A preliminary optical design is presented. (p. 106)

THURSDAY, MARCH 3, 1988—Continued

8:00 PM (Invited Paper)

ThD3 Use of an UV FEL in Studies of the Photoablation of Organic Polymers and Tissue, Thomas F. Deutsch, Massachusetts General Hospital; R. Srinivasan, IBM T. J. Watson Research Center. FEL-based diagnostics of the ablation of polymers and tissue are considered in light of present knowledge of photoablation by pulsed UV excimer lasers. Two wavelength and femtosecond-pulse ablation experiments are described. (p. 109)

8:30 PM

ThD4 FEL Applications in Laser Etching and Ablation, R. C. Estler, Fort Lewis College; N. S. Nogar, Los Alamos National Laboratory. Results are presented on mass spectral detection of the volatile products produced by photoablation of polymers and insulating ceramics. Applications of the FEL to photoetching will be discussed. (p. 113)

MEZZANINE

8:50 PM-9:10 PM COFFEE BREAK WITH DESSERT

FRIDAY, MARCH 4, 1988

FIRESIDE ROOM IN REBECCA'S

6:30 AM-8:15 AM BREAKFAST

CRYSTAL ROOM

8:00 AM-1:00 PM REGISTRATION/SPEAKER CHECKIN

MARCIAS ROOM

8:30 AM-10:30 AM

FA, BIOLOGICAL STRUCTURES

John C. Sutherland, Brookhaven National Laboratory,

Presider

8:30 AM (Invited Paper)

FA1 Potential Revolution of Free-Electron Lasers for UV Resonance Raman Spectroscopy for Biological Structural and Dynamic Studies, Sanford A. Asher, U. Pittsburgh. We discuss the utility of UV resonance Raman spectroscopy for examining the local structure of biological molecules and the local dynamics. Excitation within different chromophoric segments of biological molecules permits local studies of both intermolecular interactions and T , optical relaxations. (p. 118)

9:00 AM (Invited Paper)

FA2 High-Resolution Circular Dichroism Spectroscopy in the Vacuum Ultraviolet, Patricia A. Snyder, Florida Atlantic U. These measurements need a high-intensity, polarized, collimated, continuum source. The progress which has been made as well as future possibilities is reviewed. (p. 121)

9:30 AM

FA3 Biophysical Uses of the XUV Free-Electron Laser, Roger G. Johnston, Stephen P. Edmondson, Shermila B. Singham, Gary C. Salzman, Los Alamos National Laboratory. A free-electron laser would be useful in at least three of our research areas: (1) ultrasensitive spectrophotometry, (2) measurements of the Mueller scattering matrix, and (3) flow cytometry. (p. 126)

9:50 AM

FA4 Time-Resolved Fluorometry of the Aromatic Amino Acids, William R. Laws, J. B. Alexander Ross, Panayotis G. Katsoyannis, Herman R. Wyssbrod, Mount Sinai School of Medicine. Protein structure/dynamics can be investigated by time-resolved fluorescence of the aromatic amino acids excited by a high-repetition continuous, coherent, picosecond-pulse light source in the ultraviolet. (p. 129)

FRIDAY, MARCH 4, 1988 — Continued

10:10 AM

FA5 Potential of Free-Electron Lasers for X-Ray Holographic Microscopy of Biological Specimens, Chris Jacobsen, Janos Kirz, SUNY-Stony Brook; Dick DiGennaro, Malcolm Howells, Stephen Rothman, Lawrence Berkeley Laboratory. X-ray microscopy is a rapidly developing field that could benefit greatly from $\lambda \leq 4.5$ -nm FELs. Work in holographic microscopy could make possible the recording of suboptical resolution images of hydrated specimens in a matter of milliseconds. We discuss the exposure requirements of x-ray holographic microscopy, the opportunities and problems associated with reducing exposure times to the millisecond range, and the potential that FELs hold for dramatically advancing work in this field. (p. 133)

MEZZANINE

10:30 AM-10:50 AM COFFEE BREAK

MARCIAS ROOM

10:50 AM-12:30 PM

FB, PHOTOCHEMICAL PROCESSES I

Andrew Kaldor, Exxon Research & Engineering Company, Presider

10:50 AM (Invited Paper)

FB1 Spectroscopic and Chemical Uses of High-Flux VUV and XUV Sources, William C. Stwalley, U. Iowa. High-flux VUV and XUV sources offer opportunities for generating very high-energy, very low-entropy systems in novel ways, yielding novel spectra and photochemistry. (p. 138)

11:20 AM (Invited Paper)

FB2 Time-Resolved Studies in the Gas Phase: Reaction Dynamics and Threshold Photoelectron Spectroscopy, Tomas Baer, U. North Carolina. Pump-probe and high-resolution threshold photoelectron spectroscopy experiments are described. Both make use of the high resolution, the short pulse duration, and the high intensity of the FEL. (p. 141)

11:50 AM

FB3 Use of a Free-Electron Laser in Knudsen Effusion Mass Spectrometry Studies of Actinide Materials, Phillip D. Kleinschmidt, Los Alamos National Laboratory. Accurate bond dissociation energies and ionization potentials of actinide molecules generated in a Knudsen effusion source can be obtained using a free-electron laser ionization source. (p. 146)

FRIDAY, MARCH 4, 1988—Continued

12:10 PM

FB4 Ultrahigh-Speed Measurement of Supersonic Combustion with a UV Free-Electron Laser, Robert W. Pitz, *Vanderbilt U*. The potential of a UV FEL to make ultrahigh-speed measurements of turbulent mixing and chemistry in supersonic combustion using laser-induced fluorescence and Raman scattering is described. (p. 150)

FIRESIDE ROOM IN REBECCA'S

12:30 PM-1:30 PM LUNCH

1:30 PM-4:30 PM FREE TIME

RED DOG SALOON

4:30 PM-5:45 PM
POSTDEADLINE POSTER SESSION

FIRESIDE ROOM IN REBECCA'S

5:45 PM-7:00 PM DINNER

MARCI A ROOM

7:00 PM-10:10 PM
FC, RADIATION EFFECTS AND MEDICAL APPLICATIONS
Sanford A. Asher, *University of Pittsburgh*, Presider

7:00 PM (Invited Paper)

FC1 Ultraviolet Photobiology, John C. Sutherland, *Brookhaven National Laboratory*. Ultraviolet light damages DNA and other biological molecules resulting in death, mutations, cancer, and other deleterious effects. Ultraviolet from FELs will permit studies not feasible with other sources. (p. 154)

7:30 PM

FC2 Absorption Properties and Desirable Photon Fluxes for Experiments Using Biological Cells and Viruses in the Ultraviolet (100-400-nm) Wavelength Region, Thomas P. Coochill, *Western Kentucky U*. The absorption properties and inactivation fluences of biological cells and viruses at several UV wavelengths are compared to the available or proposed outputs from various radiation sources, including the rf-linac free-electron laser. (p. 158)

7:50 PM

FC3 Radiobiology of Ultrasoft X Rays, James Freyer, Mario Schillaci, Susan Carpenter, Michael Cornforth, Robert Sebring, Patricia Schor, Mark Wilder, Kathryn Thompson, Mudundi Raju, *Los Alamos National Laboratory*. The proposed Los Alamos XUV FEL should greatly expand our current project using ultrasoft x rays to investigate the mechanisms of radiation damage in biological systems. (p. 162)

FRIDAY, MARCH 4, 1988—Continued

8:10 PM

FC4 Multiphoton Ionization and Chemical Reaction in DNA: a Theoretical Study of Ionizing Radiation by an FEL, K. T. Lu, *Atomic Engineering Corporation*. The characterization of the interaction of FEL radiation with DNA is studied theoretically as a function of wavelength, pulse duration, power, geometric size, and penetration depth. (p. 166)

MEZZANINE

8:30 PM-8:50 PM COFFEE BREAK WITH DESSERT

8:50 PM

FC5 Biomedical Uses of the Free-Electron Laser in the UV-Violet, Richard Z. Straight, *U. Utah*. Biomedically important molecules and all tissues strongly absorb UV light. Tunable UV FELs (190-390 nm) will have potentially valuable diagnostic, therapeutic, and surgical uses in biomedicine. (p. 170)

9:10 PM

FC6 Potential Medical Uses of UV Free-Electron Lasers, Laura Esserman, *Stanford U. Medical Center*; Steven D. Conradson, *Los Alamos National Laboratory*. Ultraviolet FELs have unique, potential biomedical uses. Through the process of ablative photodecomposition, they should be particularly useful in the areas of neurosurgery, orthopedic surgery, and wound healing. (p. 175)

9:30 PM

FC7 Generation of Backscattered X Rays within an FEL Oscillator for Coronary Angiography, William E. Stein, Brian E. Newnam, Alex H. Lumpkin, *Los Alamos National Laboratory*. Intracavity generation of Compton-backscattered 33-keV photons within a 1-μm FEL resonator, together with a gated, intensified camera, is proposed for coronary angiography. (p. 179)

SATURDAY, MARCH 5, 1988

FIRESIDE ROOM IN REBECCA'S

6:30 AM-8:15 AM **BREAKFAST**

CRYSTAL ROOM

8:00 AM-12:00 PM **REGISTRATION/SPEAKER CHECKIN**

MARCIAS ROOM

8:30 AM-10:10 AM

**SA. SPECTROSCOPY OF HIGHLY IONIZED GASES AND
ION BEAMS**

*John M. Dawson, University of California at Los Angeles,
Presider*

8:30 AM **(Invited Paper)**

**SA1 Vacuum UV Free-Electron Lasers as Diagnostic
Probes of Magnetic Fusion Plasmas**, W. A. Peebles, UC-Los
Angeles. The possible use of VUV free-electron lasers to probe
the role of neutral particles in magnetic confinement fusion
plasmas is described. (p. 182)

9:00 AM **(Invited Paper)**

**SA2 Use of XUV Free-Electron Radiation for Opacities of
Highly Ionized Atoms**, A. L. Merts, Los Alamos National
Laboratory. Standard emission and transmission measure-
ments are inadequate for determining the cross section
over the spectral range needed for opacity calculations.
Free-electron lasers offer possible answers. (p. 187)

9:30 AM

**SA3 Impact of VUV/Soft X-Ray Free-Electron Lasers on the
Study of Electron Correlation in Ions**, Pascale Roy, Roger J.
Bartlett, Los Alamos National Laboratory. Experiments are
proposed to study electron correlation effects in ions. These
differential measurements on low density targets require the
spectral brightness of free-electron lasers. (p. 190)

9:50 AM

**SA4 Highly Charged Ion Precision Spectroscopy Using
Free-Electron Laser Radiation**, D. A. Church, S. D. Kravis,
Texas A&M U. Precision spectroscopy of stored, thermal
hydrogenlike ions using extreme-UV FEL radiation is dis-
cussed, with particular emphasis on the hydrogenlike
sodium ground-state hyperfine structure. (p. 193)

MEZZANINE

10:10 AM-10:30 AM **COFFEE BREAK**

SATURDAY, MARCH 5, 1988—Continued

MARCIAS ROOM

10:30 AM-12:10 PM

SB. PHOTOCHEMICAL PROCESSES II

Yuan T. Lee, University of California at Berkeley, Presider

10:30 AM **(Invited Paper)**

**SB1 Time-Resolved Spectroscopy as a Probe of the Elec-
tronic Structure and the Dynamics of Clusters**, Georg Zim-
merer, U. Hamburg, F. R. of Germany. The feasibility of an in-
vestigation of the electronic structure and the dynamics of
rare gas clusters in a crossed-beam experiment with VUV
FEL radiation for excitation is demonstrated. (p. 198)

11:00 AM **(Invited Paper)**

**SB2 Experiments on the Electronic and Geometric Struc-
ture of Molecules and Clusters Using XUV Free-Electron
Lasers**, W. Eberhardt, Exxon Research & Engineering Com-
pany. Free-electron laser sources will open up the possibility
to study the electronic structure, geometry and chemistry of
dilute species like free radicals and clusters. Taking ex-
periments carried out on molecules and deposited clusters
as examples, I illustrate the possibilities we have with an
XUV FEL to improve our understanding of these more dilute
systems. (p. 202)

11:30 AM

**SB3 Photoionization and Photofragmentation Studies of
Van Der Waals Complexes Using VUV Radiation**, E. A.
Walters, U. New Mexico; J. R. Grover, Brookhaven National
Laboratory. Potential uses of short-wavelength tunable
radiation from a free-electron laser to the chemistry of solvation
phenomena through weakly bound molecular complexes are described. (p. 204)

11:50 AM

**SB4 Molecular Photoionization and Photofragmentation
Studies Using VUV Radiation**, Robert K. Sander, Joe J. Tiee,
Los Alamos National Laboratory. Extension of state-
selective photofragmentation experiments to the VUV will
generate a broader distribution of product states and require
brighter photolysis sources than currently available. (p. 208)

MARCIAS ROOM

12:10 PM-12:15 PM **CLOSING REMARKS**

FIRESIDE ROOM IN REBECCA'S

12:15 PM-1:15 PM **LUNCH**